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April 11, 1994

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BY HAND

William F. Caton, Secretary
Federal Communications Commission
1919 M Street, N.W., Room 222
Washington, D.C. 20554

Re: Gen. Docket 90-314; Affidavit of Professor Jerry A. Hausman

Dear Mr. Caton:

Attached please find an affidavit prepared by Jerry A. Hausman, John and Jennie S. MacDonald Professor of Economics at the Massachusetts Institute of Technology. Professor Hausman is a past recipient of the John Bates Clark award of the American Economic Association, and has previously filed testimony in support of the petition for reconsideration filed by Bell Atlantic Personal Communications, Inc. ("Bell Atlantic") in this proceeding.

Professor Hausman's affidavit reiterates his and Bell Atlantic's recommendation that the Commission reconfigure its allocated 120 MHz of broadband PCS spectrum into six 20 MHz blocks. As Professor Hausman and others have explained previously, a six 20 MHz block plan will promote far greater economic and technical efficiencies; better consolidations; and overall, a much more competitive market structure than the Commission's current plan. In the attached affidavit, Professor Hausman elaborates on the flexibility of the six 20 MHz block plan in response to the contention of some that larger spectrum allocations are required to establish viable and competitive PCS businesses. As Professor Hausman explains:

> If 20 MHz blocks are economically viable, as my analysis demonstrates, then the six 20 MHz configuration allows for auctions of the fundamental spectrum building blocks of PCS. On the other hand, if PCS Action turns out to be correct that 40 MHz blocks are needed for PCS, the original 20 MHz blocks will be easily combined to create 40 MHz blocks. Thus, the potential gain from the six 20 MHz configuration is substantial while the potential loss, if 20 MHz blocks are not large enough, is small. On the other hand, the creation of oversized 30-40 MHz blocks that PCS Action

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advocates needlessly risks wasting valuable spectrum at the expense of competition, and in conjunction with the remainder of the FCC's uneven channelization scheme, will lead to a far less competitive outcome than the results achievable under a six 20 MHz block plan.

Hausman Affidavit at 3-4, ¶ 6.

Bell Atlantic believes that PCS will develop most quickly if all competitors are permitted to bring their respective strengths to bear in the PCS marketplace. A six-block plan allows for such competition to emerge quickly based upon building blocks that are viable standing alone as PCS businesses, but also satisfies the objections of those who argue that more spectrum is necessary for PCS operation in the most densely populated urban markets by allowing for rapid, efficient consolidations in the PCS auctions and in the aftermarket.

Thank you for your consideration. Please direct any questions concerning this matter to us.

Very truly yours,

Gary M. Epstein
James H. Barker
of LATHAM & WATKINS

Affidavit of Professor Jerry A. Hausman

JERRY A HAUSMAN, being duly sworn, deposes and says:

1. My name is Jerry A. Hausman. I am the MacDonald Professor of Economics at the Massachusetts Institute of Technology in Cambridge, Massachusetts, 02139. My qualifications have been given in my previous submissions in this proceeding.

I. Economic Principles of Market Allocation of Spectrum

2. The FCC is beginning a new policy in which market forces will be used to determine the allocation of spectrum via an auction mechanism. The basic idea of market allocation of scarce resources is that those individuals (or firms) who value a good the most will be able to purchase the good. Furthermore, the outcome is economically efficient since no alternative allocation of resources can lead to greater consumer welfare.[1] To quote Samuelson:

> "It means that an omniscient planner could not come along with a computer and find a solution superior to the market outcome....This concept of efficiency--that you cannot make one person better off without making another one worse off--is one of the central ideas of economics". (P.A. Samuelson and W.D. Nordhaus, Economics, 12th ed., 1985, p. 678)

The market allocation framework differs greatly from the traditional FCC decision process in which administrative decisions were used in place of market decisions to allocate scarce spectrum. Thus, the

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[1] Of course, this outcome need not hold in the presence of market failures, e.g. externalities. No reason for market failure arises in the market allocation of PCS spectrum.

key phrase for the new FCC policy should be to "let the market decide".

3. Bidders will place different values on spectrum depending on their economic (cost) situation, levels of expertise as well as their level of information and expectation of future demand and supply conditions. The highest bidder for a given frequency band should be able to buy the frequency band in all cases subject to a single exception: if a significant part of the bidder's value arises from the expected exercise of market power then the bidder should be disqualified as a potential purchaser.[2] Market power is defined here in the antitrust sense of setting the price above the competitive level. No other deviation from the outcome that everyone should be permitted to bid, with the highest bid the winner, can be permitted. Deviations always are equivalent to an administrative decision which claims (implicitly) that it can do better than the market in the allocation of resources. Such claims are inherently incorrect.

4. The best outcome from society's viewpoint would be to establish a framework for PCS which placed no restrictions on firms' bidding behavior. If spectrum were not constrained, we would be close to the preferred situation--no barriers to entry means no market power and unlimited entry would be the correct policy in a rapidly growing service such as mobile communications which has grown at 35% per year over the past five years or more. However, the FCC is not currently in the unconstrained position. The FCC has decided to allocate 120 MHz of PCS spectrum to go along with the 50 MHz of cellular spectrum and the approximately 19 MHz of ESMR

[2] The bidder might be allowed to qualify as a purchaser by promising to eliminate the source of the market power by divesting other assets if it is successful in its bid.

spectrum in the 800 MHz and 900 MHz bands. My conclusion is that if the 120 MHz of PCS spectrum is configured correctly, then the preferred situation of no constraints (or almost no constraints) on bidders can be realized. Thus, the FCC will be able to "let the market decide".

5. My recommended policy is for the FCC to configure the PCS spectrum as six 20 MHz blocks. As I explained in my December 1993 Affidavit, this configuration is superior on economic grounds to the currently proposed configuration of two 30 MHz blocks, one 20 MHz block, and four 10 MHz blocks (2-1-4 configuration). Under the currently proposed configuration, the 10 MHz blocks are likely to be uneconomic to use. Economies of scale are quite large in going from 10 MHz blocks to 20 MHz blocks. However, as economic theory would suggest, the gains in cost efficiency in going from 20 MHz blocks to 30 MHz blocks are very much smaller. In this paper I consider the question of what would be the outcome if my analysis proves to be incorrect. What are the potential losses from the six 20 MHz blocks policy as compared to the potential gains; similarly, what are the potential losses from the currently proposed 2-1-4 configuration compared to the potential gains?

6. Other groups such as PCS Action have proposed even larger blocks of spectrum than 20 MHz. Both the six 20 MHz configuration which I recommend and the PCS Action submissions agree that 10 MHz blocks are too small. If 20 MHz blocks are economically viable, as my analysis demonstrates, then the six 20 MHz configuration allows for auctions of the fundamental spectrum building blocks of PCS. On the other hand, if PCS Action turns out to be correct that 40 MHz blocks are needed for PCS, the original 20 MHz blocks will be easily combined to create 40 MHz blocks. Thus, the potential gain from the

six 20 MHz configuration is substantial while the potential loss, if 20 MHz blocks are not large enough, is small. On the other hand, the creation of the oversized 30-40 MHz blocks that PCS Action advocates needlessly risks wasting valuable spectrum at the expense of competition, and in conjunction with the remainder of the FCC's uneven channelization scheme, will lead to a far less competitive outcome than the results achievable under a six 20 MHz block plan.

7. Most importantly, the six 20 MHz proposal permits the auction to take place without the necessity of any artificial restriction on market participants. The market process will be allowed to operate in an unrestricted manner which will lead to greater economic efficiency and greater consumer welfare.

II. The Market for Mobile Voice Communications

8. I will use the market for mobile voice communications as the relevant market for my analysis. The current market participants are cellular and ESMR/SMR. The appropriate geographical scope is typically the MSA.[3] Within this starting point, I will analyze the expected outcomes under the two different configurations of the 120 MHz of PCS spectrum.

A. Cellular Telephone

9. The two cellular carriers in every MSA each have 25 MHz of spectrum. They each utilize the circa-1960 AMPS system design based upon analog radio technology.[4] Each cellular carrier has current

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[3] MSAs have been used for cellular. BTAs or MTAs will combine MSAs for the geographical scope of PCS licenses.

[4] Of course, significant improvements have been made in the switches and handsets, both of which use modern semiconductor technology.

analog capacity of about 250,000 subscribers, for an MSA total of 500,000-600,000. Thus, at the current penetration level of about 6%, MSAs with over 10 million people, e.g. New York and Los Angeles, have essentially exhausted the analog cellular capacity. If cellular continues to grow at existing growth rates, within three years the penetration level would be about 12% and MSAs with more than 4-5 million people would run out of spectrum available with analog cellular radio technology.[5]

10. To relieve the capacity problems cellular operators will implement digital radio technology in their networks. The currently preferred digital technology is TDMA which promises to expand analog capacity by a factor of three. TDMA technology is currently being installed in Los Angeles on the Block A cellular system. An alternative digital radio technology for cellular is CDMA. If CDMA works, it will increase analog capacity by a factor of 5-10 times current capacity. Considerable controversy exists over whether CDMA will provide in practice the performance its supporters claim; PacTel Cellular has announced it will begin to implement CDMA cellular technology in Los Angeles (Block B) and Atlanta (Block A) during 1994.

11. The transition from analog to digital radio technology is likely to create problems which will stop cellular networks from achieving all of the gains in capacity for a significant amount of time. A combination analog and digital network (an overlay network) will be required so that both the current analog customer base as well as the future digital customer bases can receive service. This problem can be overcome by a subsidy plan by the current operator; however, the expense to switch over most customers could

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[5] These MSAs would include the top 10 MSAs from Chicago down to Houston.

be quite high. Furthermore, the network would still need to retain analog capacity to service analog roaming customers. Thus, over say the next five years, neither TDMA nor CDMA networks is likely to be able to serve its theoretical capacity multipliers.

12. Cellular will begin with an embedded customer base of almost all voice mobile customers. An important question is whether this embedded customer base will allow cellular to exercise market power or whether the embedded customer base suggests a policy of restricting the cellular operators' competitive actions. I do not see in any respect how the current customer base confers future market power on the cellular carriers. Their networks will be independent, both horizontally and vertically, of their ESMR and PCS competitors.[6] The cellular carriers will be unable to restrict either the entry or the expansion (collectively the "supply elasticity") of its ESMR or PCS competitors, except through normal competitive strategies, so long as sufficient spectrum exists for the ESMR/PCS competitors. Thus, in the presence of sufficient spectrum, no competitive reason exists to restrict the cellular operators' competitive strategies.

B. ESMR/SMR

13. ESMR networks will use a digital technology similar to the technology of digital cellular networks. The digital technology is called the MIRS technology, and it was developed by Motorola. The form of TDMA to be used by ESMR will allow a 6 times increase in channel capacity over current analog cellular service, rather than

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[6] To the extent that a cellular carrier is a LEC, interconnection will cause the ESMR/PCS operators networks to be connected to the landline networks. However, the FCC has implemented interconnection policies for cellular in similar circumstances which have obviated any need to restrict the wireline cellular operators' competitive actions.

the 3 times increase to be used by cellular TDMA.[7] MIRS technology permits cellular re-use of spectrum which will expand capacity greatly over current SMR. In a given MSA, an ESMR provider with all of the 280 800 MHz SMR channels will have 14 MHz of spectrum, compared to the 25 MHz of spectrum which each cellular carrier will have. The SMR channels are currently used primarily to provide analog dispatch service, along with small amounts of interconnect. Similar problems of customer migration and overlay networks will likely exist for ESMR, as with the migration to digital cellular.

14. The first ESMR provider has begun operation with the inception of Nextel's (formerly Fleet Call) ESMR network in Los Angeles. Nextel's original plan was to offer ESMR in six cities. Nextel began operation in Los Angeles in 1993 and plans to begin operation in San Francisco and the rest of California, Chicago, and New York in 1994.[8] Nextel has now expanded its plans, and has purchased sufficient ESMR spectrum from Motorola and other companies to be able to offer its services to about 70% of the population in the U.S.[9] Nextel's proposed service areas cover about 180 million people and 45 of the top 50 U.S. MSAs. All of the top 10 MSAs will be covered. Nextel has recently announced that its network will cover the U.S. within two years. Nextel has not encountered any difficulty in raising capital to finance these expansion plans.[10]

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[7] ESMR also plans to offer dispatch, paging, data, and vehicle tracking services. However, digital cellular will also be able to offer these same services (absent regulatory restrictions which are expected to be eliminated soon by the FCC) since the technology and spectrum location will be quite similar.

[8] "Opening Comments of Nextel Communications", Before the California PUC, February 25, 1993.

[9] McCaw, the largest cellular carrier, has service areas which cover about 25% of the U.S. population.

[10] On February 28, 1994 MCI announced an investment in Nextel for $1.3 billion.

Indeed, the market capitalization of Nextel currently exceeds $6.5 billion. Thus, Nextel will be a formidable competitor to cellular and PCS with its all-digital network offering service in almost all areas of the U.S.

15. Two other major ESMR providers have also bought significant amounts of 800 MHz SMR spectrum to offer large regional ESMR networks. Dial Call (formerly Dial Page) plans to begin construction of ESMR networks in Atlanta, Charlotte, Miami, and Orlando beginning in 1994. Overall, Dial Call plans to provide ESMR service in the states of Virginia, West Virginia, Kentucky, North Carolina, Tennessee, South Carolina, Alabama, Georgia, Florida, Mississippi, and Louisiana. Thus, Dial Call will offer ESMR voice mobile service throughout the Southeastern U.S. CenCall also plans to construct a super-regional ESMR network. Major MSAs in which Cencall plans to construct networks include Denver, Kansas City, St. Louis, Tulsa, Oklahoma City, Portland, and Seattle. CenCall's network will cover Colorado, Idaho, Kansas, Missouri, Oklahoma, Oregon, Washington, and Wyoming. Thus, Nextel, Dial Call, and CenCall will all offer ESMR voice mobile service which will seamlessly cover almost all of the U.S.[11]

16. Geotek plans to offer mobile telephone (and other mobile digital services) in the 900 MHz band. Geotek has acquired 900 MHz spectrum in 32 MSAs and expects to buy spectrum in 8 more MSAs. Geotek will begin operation in the first 10 MSAs in 1995. Geotek will use FHMA (Frequency Hopping Multiplexing) which it claims will offer 30 times analog cellular capacity compared to the 3-6 times increase offered by TDMA on cellular or ESMR networks.

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[11] Since all three ESMR providers will utilize the same Motorola MIRS technology, seamless roaming service will be straightforward to provide.

17. A natural question is whether ESMR can compete with cellular. Market experience easily dispels this concern. Market capitalization as of Feb. 11, 1994 of the ESMR companies was:

Table 8: Market Capitalization of ESMR Providers
As of February 11, 1994

Company	Capitalization	1993 Increase
1. Nextel	$6.0 Billion	282%
2. Dial Call	$1.7 Billion	1150%
3. Cencall	$0.9 Billion	187%
4. Geotek	$0.7 Billion	412%

These market capitalizations, e.g. Nextel is about $35 per pop, are only consistent with the market expectation of competition with cellular. Given current dispatch penetration, average revenue per month of less than $20, and growth rates of about 10-15% per year, these market capitalizations relate to an anticipated ESMR network for the company and would be astronomically high if they were for dispatch (and limited SMR interconnect) only. However, they are consistent with cellular growth rates of 35-40% per year and average per month revenues of cellular in the $60 range. Thus, the market clearly believes that ESMR will be competitive with cellular.[12]

18. The other indication of market response to ESMR is that in Los Angeles, cellular providers decreased their prices by about 17% in the summer of 1993 for customers who would sign 1 year contracts in response to the Nextel ESMR system beginning operation. Up to that point, cellular prices had not decreased significantly in

[12] Analysts reports by Merrill Lynch, First Boston, and a host of other investment bankers all consistently state that ESMR will compete with cellular.

Los Angeles in the preceding 5 years, which is consistent with the lack of analog cellular capacity in Los Angeles during this time period.

19. Thus, in each MSA I expect at a minimum one 800 MHz band ESMR digital mobile voice network operator together with Geotek, or another 900 MHz band ESMR provider. The ESMR providers will offer a much larger seamless geographic network than the cellular networks will provide. Nextel will be along both the east and west coasts, Dial Call will be throughout the southeastern U.S., while Cencall will be in the midwest, mountain regions, and Pacific Northwest. Along with the two cellular networks in each MSA, a total of either 3 or 4 voice mobile networks will exist before the implementation of PCS.

C. PCS

20. The FCC plans to auction off 120 MHz of PCS spectrum beginning in 1994. Under the current proposal, the 2-1-4 proposal, the original two 30 MHz blocks can be aggregated up to 40 MHz. Within region, the current cellular operators will be allowed to own only 10 MHz of PCS spectrum. Thus, their maximum amount of total spectrum will be 35 MHz. However, it is believed that the 10 MHz of spectrum that cellular operators will be able to buy will be difficult to integrate with their current spectrum since current cellular spectrum is in the 800-900 MHz bands while the allotted 10 MHz of PCS spectrum will be in the 2100-2200 MHz bands. Engineering and economic difficulties of integration, especially in the manufacture of handsets, will make the integration technically difficult as well as expensive.

21. I now compare the possible competitive outcomes under different possible FCC rules on PCS spectrum allocation and combinations. Note that the total amount of available spectrum for voice mobile services will be approximately 190 MHz: 50 MHz in the cellular bands, 20 MHz in the ESMR bands, and 120 MHz in the PCS bands. Since all of the services in these bands will be able to use similar digital technology, I will do calculations based on a capacity basis using methodology contained in the 1992 FTC and DOJ Merger Guidelines (MG). I will compare potential outcomes under the current FCC 2-1-4 proposal with the alternative six 20 MHz proposal which I favor.

III. Evaluation of Two Spectrum Proposals

A. The FCC 2-1-4 Proposal

22. In Exhibit 1 I first consider the HHI index from the MG under the assumption of 2 cellular providers, 1 ESMR provider, and all 7 PCS providers.[13] The initial HHI assuming that no spectrum aggregation takes place so that there are 2 cellular providers, 1 ESMR provider, and all independent PCS providers leads to an HHI calculation of 1177. However, I believe that a more likely outcome will be for the 2 cellular providers to each purchase their allowed 10 MHz of PCS spectrum, and the remaining two 10 MHz PCS bands to combine into a single block. Thus, 4 independent PCS providers would remain along with the 2 cellular providers and the ESMR provider(s). The MG HHI would now be 1509. This HHI falls into the "moderately concentrated" zone of the MG. To the best of my knowledge the DOJ has stopped only one merger which fell into this

[13] I thus combine the 800 MHz band and 900 MHz ESMR providers. This combination will lead to conservative estimates.

zone over the past 10 years.[14]

B. The Six 20 MHz Blocks Proposal

23. Under this proposal we would start with the 2 cellular providers, 6 PCS providers, and 1 ESMR provider. The MG HHI is 1121. Now even if both cellular providers each bought one of the PCS spectrum blocks, the HHI rises to 1675, which is still in the moderately concentrated zone of the MG.[15] Indeed, no significant economic difference in terms of expected competitive outcomes can be ascribed to the likely outcome an HHI of 1509 under the current 2-1-4 proposal and the HHI of 1675 under the six 20 MHz proposal. In terms of the number of firms we would likely end up with 2 cellular providers, 4 independent PCS providers, and 2 ESMR providers (including Geotek). Even if subsequently 2 PCS providers merged, we would still have 6-7 independent mobile voice providers, which is more than adequate to expect competitive performance of markets.

24. In terms of competitive analysis, two types of analysis are done in the MG. First, the question can be asked whether one firm will be large enough to exercise unilateral market power? The answer is clearly no because the merged cellular and PCS provider will have only 23.7% of the 190 MHz available for voice mobile services. Such a small percentage is well below levels usually considered to be the minimum needed to cause concern; the MG uses a

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[14] A few more mergers (unknown to me) may have been challenged which fall into this range. However, I am confident that the vast majority of mergers challenged by the DOJ fell above the 1800 HHI level which corresponds to "highly concentrated" markets.

[15] While the increase in the HHI here is significant, typical DOJ policy would permit the acquisition of the spectrum because the final HHI of 1675 is still in the moderately concentrated zone of below 1800. Under a competitive effects analysis of the MG, neither cellular company would be large enough to exert unilateral market power, and co-ordinated interaction among cellular providers, ESMR providers, Geotek, and PCS providers is extremely unlikely for reasons I discuss below.

minimum level of 35% of the market before concerns arise. Here given the lack of barriers to expansion of market participants (e.g. a high elasticity of supply), even less concern would arise than in the usual situation where "fringe firms" often have barriers to expansion.

25. The other competitive analysis of the MG arises from the possibility of co-ordinated interaction. The HHIs are well below levels of concern typically used in the MG or used in practice by the DOJ. Furthermore, economic factors would make co-ordinated interaction quite unlikely. First, different costs of production and technologies would make agreement difficult to reach.[16] Next, cheating (where one or more providers offer "secret discounts") would be difficult to detect given the number of different providers and the different menu of services they are likely to provide, e.g. ESMR plans to offer voice mobile, paging, and data all within a single handset. Lastly, credible punishment (which would attempt to remove the incentive to cheat) is extremely unlikely given the very low marginal costs found in wireless services. A "price war" strategy would be extremely expensive and would be unlikely to succeed.

26. However, the best feature of this six 20 MHz band proposal is that no restrictions need to be placed on market participants.[17] That is, any firm can buy a 20 MHz block of PCS spectrum. If cellular providers can utilize the spectrum more

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[16] I would expect cellular platforms, cable platforms, and LEC platforms, as well as "pure PCS" platforms to be used as the infrastructure for the PCS networks. ESMR will have a separate platform based on the MIRS technology.

[17] Of course, the restriction that no firm is allowed to buy a significant amount of the overall spectrum would still be enforced. But no restrictions beyond the usual antitrust strictures would apply.

efficiently, they will bid higher prices for the spectrum block. Similarly, if a local cable TV provider can utilize the spectrum more efficiently, it too would be expected to bid a higher price for the spectrum block. These expectations are consistent with the FCC OPP report on the importance of economies of scope for existing cellular and cable providers with respect to PCS.[18] Society benefits through greater economic efficiency from these economies of scope--lower costs arise in the provision of PCS. Consumers will also benefit because under competition lower costs should lead to lower prices. Under a market allocation of spectrum, society benefits from these economies of scope. They should not be used to handicap the cellular (or cable) companies in a misguided attempt to create some vision of competitive parity.

IV. What if 20 MHz Bands are Not Sufficient for PCS?

27. My proposed plan of six 20 MHz PCS bands has the primary feature that no restrictions will need to be placed on potential PCS providers in their business strategies to buy spectrum and offer PCS. However, certain groups, in particular PCS Action, have claimed that 20 MHz blocks are not enough and that larger 40 MHz blocks are required, primarily because of microwave interference.[19]

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[18] D.P. Reed, "Putting It All Together: The Cost Structure of Personal Communications Services" (OPP Working Paper No. 28, Nov. 1992).

[19] See e.g. PCS Action, "White Paper on PCS Spectrum Issues", July 21, 1993 and A.D. Felker, "PCS Assignment Bandwidth and the Public Interest", September 10, 1993, submitted on behalf of Time Warner Telecommunications. American Personal Communications (APC) also claims that 20 MHz blocks are too small because of interference from incumbent microwave users (December 30, 1993, pp. 10ff.). However, APC never explains how 10 MHz blocks will be sufficient to provide service since it supports the current 2-1-4 proposal which would lead to 4 10 MHz blocks. Furthermore, APC is incorrect in its claim that ESMR can operate with less spectrum than PCS because ESMR does not share spectrum or have to avoid interferences with co-channel licensees. (p. 13) To the contrary, ESMR must share spectrum with other SMR providers (the "short spacing" problem which arises from the FCC co-channel protection rules), and also will not have contiguous spectrum because of other SMR

The engineering analysis undertaken by Dr. C. Jackson and Prof. R. Pickholtz and my economic analysis, to the contrary, demonstrate that while 10 MHz bands are not sufficient for PCS, that 20 MHz are large enough to be economically viable.[20] Our estimates demonstrate that an increase from a 10 MHz network to a 20 MHz network leads to cost decreases of 14-26% which are significant economies of scale. However, the additional cost increase in going from a 20 MHz network to a 30 MHz network is only 5-8%. Thus, much greater economies of scale are found in adding 10 MHz to go from 10 MHz to 20 MHz than from adding another 10 MHz to go to 30 MHz networks.

28. However, both my analysis and the PCS Action analysis are based on estimates. A feature of the six 20 MHz configuration is that both analyses agree that 10 MHz blocks are too small, but if 20 MHz blocks are economically viable then the six 20 MHz configuration allows for auctions of the fundamental spectrum building blocks of PCS. On the other hand, if PCS Action turns out to be correct that 40 MHz blocks are needed for PCS, the original 20 MHz blocks will be easily combined to create 40 MHz blocks.

29. Mr. Felker of Time Warner Communications argues against aggregation on the grounds of transactions costs, delay, and lower

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providers, while PCS will have contiguous spectrum. (c.f. "Opening Comments of Nextel Communications", before the California PUC, February 25, 1994, p. 13) For instance, within an MSA an ESMR provider may have use of a channel within part of the MSA, but not in other parts of the MSA, because of another SMR provider which has the license for that same channel. Furthermore, ESMR will not have contiguous spectrum because of other SMR providers, while PCS will have contiguous spectrum. Thus, APC wrongly characterizes ESMR spectrum as being superior to PCS spectrum because of potential interference problems.

[20] C.L. Jackson and R. Pickholtz, "Maximally Efficient PCS Channel Plans" (Dec. 7, 1993) and J. Hausman, "Affidavit submitted to FCC" (Dec. 6, 1993) on behalf of Bell Atlantic PCS.

proceeds of a public auction.[21] However, he admits that 40 MHz blocks may be too large and his proposal to solve this problem by allowing spectrum "de-aggregation" will also incur transactions costs. His claim of delay is also not justified because 40 MHz blocks can be bought immediately at auction under the proposed FCC auction rules. Lastly, I consider his claim of lower auction proceeds from 20 MHz blocks rather than 40 MHz blocks. Here economic theory states that either higher or lower proceeds can be the result. However, Mr. Felker would be correct that 40 MHz blocks would lead to higher auction proceeds only in the situation where the three 40 MHz spectrum blocks would lead to less competition than six 20 MHz blocks so the future expected profits would be higher.[22] However, these future expected profits, and higher spectrum values, would come at the expense of consumers who would end up paying higher prices for PCS. This outcome is not a desirable goal for FCC policy.

30. Given the uncertainty over the optimum size of PCS blocks, the six 20 MHz plan has the advantage of greater flexibility than the three 40 MHz plan of PCS Action and Time Warner or the uneven 2-1-4 FCC plan featuring 30 MHz blocks. The minimum size of economically viable PCS networks appears to be 20 MHz blocks. Thus, this size block would be the appropriate size to auction. If it turns out to be the case that larger blocks of spectrum are needed, the 20 MHz will be easily aggregated to larger size blocks.

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[21] Felker, op. cit., pp. 22ff.

[22] My conclusion is based on the assumption that all of the PCS spectrum will be economical to construct networks.

V. Conclusions

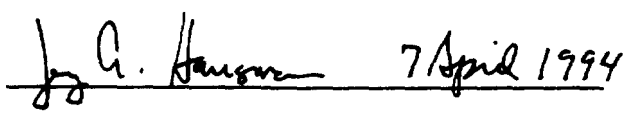
31. Competitive advantages are likely to arise from cellular companies being able to play a greater role in PCS. Since restrictions such as the currently proposed 10 MHz restrictions for cellular companies are inherently anticompetitive because they interfere with the workings of the market, they should only be used when a potential anti-competitive problem is clearly present. My analysis has demonstrated that no such potential problem will exist if the FCC uses a six 20 MHz block allocation.

32. If both of the in-region cellular companies purchased a 20 MHz PCS block, sufficient competition would still exist to assure that consumers would face competitive prices. In each mobile services market I would expect 2 cellular/PCS providers, 1 or more ESMR provider, and 4 PCS providers. Also Geotek, which has announced plans to use a FHMA technology in the 900 SMR band, would be an additional competitor in the 40 cities they now plan to provide service in. Thus, I expect 3-4 competitors in the 800-900 MHz bands and an additional 4 independent PCS competitors in markets which are large enough to support that much competition.

33. Even if the 4 independent PCS providers decided to consolidate into 2 40 MHz blocks as would be allowed by proposed FCC regulations, we would still have 3-4 competitors in the 800-900 MHz bands plus 2 independent competitors in the PCS bands. A total of 5-6 independent firms is more than adequate to assure competition among mobile service providers. Indeed, given the high fixed costs and relatively low marginal (and variable) costs of mobile service networks, the outcome may well be lower than 5-6 competitors, except in densely populated markets where demand is expected to be quite

high. Competition among 2 cellular operators, 1 or 2 ESMR providers, and 2-4 PCS providers, all of whom will have access to similar digital technology and the ability to expand output greatly, will assure sufficient competition and affordable prices for mobile telecommunications for consumers. Competition among firms with access to similar technology and the ability to expand output economically typically leads to quite competitive outcomes and the expected consumer benefits.

34. With an allocation of 6 20 MHz PCS blocks and full participation by cellular carriers in PCS, the economies of scope inherent in current cellular networks will be fully utilized. These economies of scope and the existing cellular infrastructure have been recognized by the FCC and were estimated by Mr. Reed in his report. Thus, an advantage of reconfiguring the PCS allocation will be the removal of any restriction on cellular participation which will allow firms with considerable expertise and cost advantages to compete fully. This increased competition will benefit consumers. A market outcome, without restrictions on competitors, will provide the most economically efficient outcome in mobile telecommunications. An unrestricted market outcome will provide the appropriate beginning for the new FCC policy of market determination of spectrum allocation.



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